

## Study and Survey of Motorised Concrete Mixer

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**Abstract:** A concrete mixer machine is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. Concrete is an important component required for construction of houses and roads. However, most operation of mixing concrete in Myanmar is done manually as a result of lack of insufficient machinery and high importation cost. The mixing procedure includes the type of mixer, the order of introduction of the materials into the mixer, and the energy of mixing (duration and power). To control the workability or rheology of the fresh concrete, for example, it is important to control how the concrete is processed during manufacture. In this overview, the different mixers commercially available will be presented together with a review of the mixing methods. Also Construction workers handle cement which has constituents to produce both irritant contact dermatitis and corrosive effects (from alkaline ingredients, such as lime) and sensitization, leading to allergic contact dermatitis (from ingredients, such as chromium).

**Keywords-** Mixer, Concrete.

### 1. INTRODUCTION

A concrete mixer is also commonly called a cement mixer, is a device that homogeneously combines cement, aggregate such as sand or gravel, and water to form concrete. A typical concrete mixer uses a revolving drum to mix the components. Today's market increasingly requires consistent homogeneity and short mixing times for the industrial production of ready mix concrete, and more so for precast concrete. This has resulted in refinement of mixing technologies for concrete production. To supply continuously the ready mix its necessary that the concrete mixer should be in good condition of working, but it has been observed that the shaft and blade of mixer get failed after some uses of time. So in this project I am trying to identify the different causes of blade and shaft failure. Concrete is a structural material widely used in the construction industry. It consists essentially of cement, fine aggregate (sand) and coarse aggregate (natural gravels or chippings). These constituent materials proportioned are properly mixed together with water to form the concrete. The cement serves as the binder to the aggregates while the aggregates serve as the filler materials that give strength to concrete. Concrete has the unique

distinction of being the only construction material manufactured on the site, whereas other materials are merely shaped to use at the work site. The amount of concrete used worldwide, ton for ton, is twice that of steel, wood, plastics, and aluminum combined. Concrete's used in the modern world is exceeded only by that of naturally occurring water. To determine the mixing method best suited for a specific application, factors to be considered include location of the construction site (distance from the batching plant), the amount of concrete needed, the construction schedule (volume of concrete needed per hour), and the cost. However, the main consideration is the quality of the concrete produced. This quality is determined by the performance of the concrete and by the homogeneity of the material after mixing and placement. There should be a methodology to determine the quality of the concrete produced, but only few methods and only one attempt of standardization were found in the literature. The methodology to determine the quality of the concrete mixed is often referred to as the measurement of the efficiency of the mixer. The efficiency parameters of a mixer are affected by the order in which the various constituents of the concrete are introduced into the mixer, the type of mixer, and the mixing energy (power and duration) used.

#### 1.1. Main Parts of Concrete Mixer

- **Drum:** It is the mixing chamber. It will rotate in a direction to mix the cement, water and aggregates and in the opposite direction to discharge the concrete mixtures.
- **Blades:** Blades are installed inside of the drum and special designed to mix the cement very well.
- **Shaft and Bearing:** Shaft and bearing are important in concrete mixers to rotate the drum.
- **Motor:** Motor produced the required power to operate the shaft.
- **V-belt:** The V-belt acts as a transmission belt connecting the pulleys; it transmits the power from the motor to the shaft.
- **Pulleys:** A pulley is a wheel on a shaft that is designed to support movement and transfer of power between the shaft and belt.

### There are three main types of drum mixers

1. Non-Tilting Drum.
2. Tilting Drum.

### 2. WORKING PRINCIPLES OF CONCRETE MIXER

A typical concrete mixer uses a small revolving drum to mix the components. For smaller jobs the concrete made at the construction site has no time lost in transport, giving the worker sample time to use the concrete before it hardens. Portable concrete mixers may be powered by engines, although it is more common that they are powered by electric motors using standard mains current. Cement, sand and other aggregates are directly added to the mixing drum manually.



Fig1. Typical Concrete Mixer

#### 2.1. Specification of Proposed Mechanism

**Function : Motorized.**

**Specification :**

- Type of primemover : Motor powered
- Application selected:- Concrete mixer
- Labor requirement:- one Labor
- Overall dimensions (Tentative): 1230 x 1250 x 835 mm
- Capacity size : 10 liter per 5 min
- General Information: The machine consists of a frame structure, the speed reduction drive, Sprocket and ratchet arrangement.

#### 2.2. Types of Concrete Mixer

There are two main types of concrete mixers are batch concrete mixers and continuous mixers. Both types of concrete mixers have their use in different kinds of projects and they serve their purpose well. Concrete mixers are vital part of concrete batching, one cannot overlook their importance.

##### 2.2.1. Batch Concrete Mixer

Batch mixers are widely used machines for concrete mixing. Concrete mix obtained by this mixer is collected batch by batch and time by time. So, it is called as batch mixer.

In general, batch concrete mixers are two types;

a. Drum type concrete mixers

##### 2.2.2. Drum Type Concrete Mixers

This is also called as free fall mixer or gratify mixer. In this type of mixer, concrete is mixed by lifting the ingredients with the help of fixed blades inside a rotating drum and then dropping the material by overcoming the friction between the mixture and the blades. The drum of the mixer can be filled and emptied by changing its directions of rotation, opening it or tipping it up. Rotation speed must carefully follow machine specific instructions and should not be too fast so that the free fall of the mixture is not interrupted by the centrifugal force. The drum mixer suits concretes that are not too stiff; usually with a slump up to 50 mm is commonly used in construction sites. Truck mixers also use free fall mixing. Since the ingredients in a free fall mixer fall from height, there is some attrition of aggregates. This type of mixers is used for producing large volumes of concrete. These mixers are noted for having high production speeds, low maintenance and ideal for slump concrete.

### 3. DRUM MIXER IS AVAILABLE IN THE FOLLOWING FORMS

#### 3.1. Tilting Drum Mixers

Tilting mixers are usually trailer-mounted or otherwise portable, small to mid-size mixers, used either as main concrete mixing equipment on small sites or as ancillary equipment on sites served by concrete plant. The drum has two axes: one around which the drum rotates and another that serves to change from loading and mixing position (drum opening up) to discharging position (drum opening down). This position change is done manually by a dump wheel (or handle, in the smaller mixers), while drum rotation is electric, gasoline, or diesel powered. Drums are traditionally made of steel, but polyethylene drums for easier cleaning are now offered. Most mixers are of the side-dump type, but end-dump mixers are also manufactured. Material is generally loaded manually, directly into the drum. There are larger-size self-loading units equipped with a tilting hopper. After being filled manually at ground level, the hopper is tilted up mechanically and dumps the material into the drum. A built-in mechanical drag shovel to facilitate aggregate loading into the hopper is optional in some models.

The drum is conical or bowl shaped with internal vanes and the discharge is rapid and unsegregated so that these mixers are suitable for mixes of low workability

and for those containing larger size aggregate. The drum axis usually stays at an angle of 15 degree from horizontal during mixing. Tilt mixer offers consistent mixing with lower operating and maintenance cost. Tilting drum is the most common type of drum mixers for small batches. Tilting mixers can handle largersize aggregates more easily and will discharge mixed concrete rapidly than a non-tilting mixer.

### 3.2. Non-Tilting Drum Mixer

A non-tilting drum mixer is one in which the axis of the mixer is always horizontal, and discharge takes place by inserting a chute into the drum or by reversing the direction of rotation of drum. Because of slow rate of discharge, some segregation may occur.

There are two openings, one at each end of the drum: one for feeding the ingredients, the other for discharging the mixture. Blades inside the drum mixes the components to homogenize them into concrete mixers discharge the concrete through a chute, which is placed on an inclined plane. Needless to say, the discharge time of this concrete mixer is slow. So, non-tilting concrete mixer has its use for smaller projects only. Moreover, this type of concrete mixer is more suitable for mixing smaller size aggregates, because the larger sizes segregate easily. Its mixing capability is also not that much efficient.

### 4. CONCLUSION

Concrete is used extensively for construction purpose. Considering the usage of concrete, mechanization of the process is required to increase production output. Furthermore, mixing is a complicated process that is affected by the type of mixer, the loading method, the energy of mixing, and most importantly the material for the blade. In this design, a stainless steel material was selected as a result of strength, corrosion was overcome in this new design. In my paper, concert mixer, designed for the user should be cheap, easy to maintain and easy to use for mixing. And then local material should be used. According to the design calculation of mixer concrete required mixing force 750 N and transmission power required 1.2 hp.

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